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EXAMINER

FIEGLE, RYAN PAUL

ART UNIT

PAPER NUMBER

2183

DATE MAILED: 01/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/671,844	<b>Applicant(s)</b> JAMIL ET AL.	
	<b>Examiner</b> Ryan P. Fiegler	<b>Art Unit</b> 2183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Claim Rejections - 35 USC § 101***

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 11-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 11-20 claim an article of manufacture including a machine readable medium which the specification defines as including, "an optical or electrical wave 660 modulated or otherwise generated to transport such information," which has been found to be non-statutory.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-9, 11-19 and 21-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Merchant et al. (US Patent 6,385,715).

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5. As per claim 1:

Merchant et al. teaches a method comprising:

issuing an instruction selected from a queue (column 3, lines 25-33; column 3, lines 43-47);

enqueueing the instruction issued within a recirculation queue in one of a blocked state and an unblocked state if completion of the instruction is prevented by a detected blocking condition (column 8, lines 42-53); and

reissuing a selected instruction from the recirculation queue once a detected blocking condition of an instruction within the recirculation queue is satisfied (column 8, lines 42-53).

6. As per claim 2:

The method of claim 1, wherein issuing comprises:

arbitrating between a plurality of queues to select a queue (column 9, lines 42-52);

selecting a current instruction from the queue selected (column 9, lines 42-52);  
and

issuing the current instruction for the queue selected (column 9, lines 42-52).

7. As per claim 3:

The method of claim 2, wherein issuing the current instruction comprises:

determining a state of the current instruction (column 9, lines 58-64);

selecting an alternate queue from the plurality of queues if a state of the selected instruction is blocked (column 9, lines 65-67); and

issuing an instruction selected from the alternate selected queue (column 9, lines 42-55).

8. As per claim 4:

The method of claim 1, wherein enqueueing comprises:

detecting the blocking condition prohibiting the instruction issued from completion (column 8, lines 54-67);

placing the instruction within the recirculation queue (column 9, lines 1-8);

setting a state of the instruction as blocked to prohibit reissue of the instruction (column 9, lines 25-33) (All instructions in the replay queue are blocked and will not be not be reissued until the blocking condition has been cleared.); and

storing the detected blocking condition (column 12, lines 51-57) (The fact that the replay unloading controller can selectively choose which long latency instruction is referenced by data return signal shows that the blocking condition was stored.).

9. As per claim 5:

The method of claim 1, further comprising:

identifying blocking conditions of instructions within the recirculation queue (column 12, lines 51-57);

determining whether any blocking condition of any instruction within the recirculation queue is satisfied (column 12, lines 51-57);

enabling recirculation of instructions from the recirculation queue by setting a state of each instruction within the recirculation queue to an unblocked state if any blocking condition is satisfied (column 12, lines 58-60).

10. As per claim 6:

The method of claim 1, wherein reissuing instructions comprises:

receiving a request to issue an instruction contained within the recirculation queue (column 12, lines 51-55) (The data return signal is a request to issue since instructions are issued based on the receiving of data.);

determining a state of a current instruction of the recirculation queue (column 12, lines 55-57);

issuing the current instruction if the state of the current instruction is an unblocked state in response to the received request (column 12, lines 57-60; column 12, lines 14-21); and

disregarding the request if the state of the current instruction is a blocked state (column 12, lines 57-60; column 12, lines 14-21) (The unloading controller chooses which of the replay queues should be unloaded based on the data return signal. Based on the control signals to the mux, the instruction is either issued if it was the instruction chosen by the unloading controller or denied if it was not chosen.).

11. As per claim 7:

The method of claim 1, wherein enqueueing comprises:

determining whether the detected blocking condition preventing the instruction issued from completion is a transient blocking condition (column 9, lines 1-4; column 7, lines 1-9) (Placing instructions in the replay loop is a determination of a transient blocking condition since it is timed sensitive condition based on an L0 cache miss, L1

hit. The loop is designed to provide enough time for the data to be there by the time the instruction is reissued.);

setting a state of the instruction to an unblocked state if the detected blocking condition is transient (column 8, lines 65-67; column 9, lines 1-8) (As was discussed above, instructions are only in a blocked state if they are put in the replay queue. Since transient instructions are put in the replay loop, they are not blocked and ready for issue as soon as they arrive at the mux.); and

resetting a state of each instruction within the recirculation queue to an unblocked state (column 9, lines 28-36).

12. As per claim 8:

The method of claim 1, wherein reissuing selected instructions comprises:  
issuing an unblocked instruction in response to a received request (column 9, lines 28-36);

enqueueing the reissued instruction if a blocking condition of the instruction remains unsatisfied (column 7, lines 9-12);

setting a state of the reissued instruction to a blocked state (column 8, lines 42-53); and

storing the blocking condition (column 12, lines 51-57) (The fact that the replay unloading controller can selectively choose which long latency instruction is referenced by data return signal shows that the blocking condition was stored.).

13. As per claim 9:

The method of claim 1, wherein the detected blocking condition is one of a data blocking condition and a resource blocking condition (column 8, lines 13-16).

14. As per claims 11-19:

Claims 11-19 recite the same limitations for a product of manufacture containing instructions for executing the method of claims 1-9.

Although Merchant et al. do not explicitly disclose a product of manufacture containing instructions for executing the method described above, such is inherent since it is impossible to execute the method unless it is embodied in some form of computer readable medium.

Therefore, claims 11-19 are rejected for the same reasons as claims 1-9.

15. As per claim 21:

Merchant et al. teach an apparatus, comprising:

a received instruction queue to store received instructions (column 3, lines 25-33; column 3, lines 43-47);

a recirculation queue (Figure 1, item 170);

arbitration logic to select one of the received instruction queue and the recirculation queue from which to issue a current instruction (column 9, lines 42-52);  
and

blocked instruction detection logic to identify instructions blocked from execution by detected blocking conditions, and to enqueue the instructions onto the recirculation queue in one of a blocked state and an unblocked state, including a respective blocking condition of each instruction within the recirculation queue (column 9, lines 1-8).



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16. As per claim 22:

The apparatus of claim 21, wherein the blocked instruction detect logic further comprises:

blocked condition satisfaction logic to detect whether a blocking condition of an instruction within the recirculation queue is satisfied and to set a state of each instruction within the recirculation queue to an unblocked state if a blocking condition of an instruction within the recirculation queue is satisfied (column 9, lines 25-36).

17. As per claim 23:

The apparatus of claim 21, wherein the arbitration logic to determine a state of a selected instruction, select the received instruction queue if a state of the selected instruction is blocked, and issue an instruction selected from the received instruction queue (column 9, lines 64-67).

18. As per claim 24:

The apparatus of claim 21, wherein the blocked instruction detect logic to determine whether the detected blocking condition is a transient blocking condition (column 9, lines 1-4; column 7, lines 1-9) (Placing instructions in the replay loop is a determination of a transient blocking condition since it is timed sensitive condition based on an L0 cache miss, L1 hit. The loop is designed to provide enough time for the data to be there by the time the instruction is reissued.), set a state of the instruction placed within the queue to an unblocked state if the detected blocking condition is transient (column 8, lines 65-67; column 9, lines 1-8), and reset a state of each instruction within

the recirculation queue to an unblocked state to enable reissue of instructions contained within the recirculation queue (column 9, lines 28-36).

19. As per claim 25:

The apparatus of claim 21, wherein the blocked instruction detect logic to enqueue a reissued instruction if a blocking condition of the instruction remains unsatisfied (column 7, lines 9-12), to set a state of the reissued instruction to a blocked state (column 8, lines 42-53) and to store the blocking condition (column 12, lines 51-57) (The fact that the replay unloading controller can selectively choose which long latency instruction is referenced by data return signal shows that the blocking condition was stored.).

20. As per claim 26:

Merchant et al. teach a system comprising:

a memory controller coupled to a memory (column 4, lines 20-23);

a processor coupled to the memory via a bus (Figure 1, item 100), the processor including:

a bus interface unit coupling an execution core to a cache memory including:

a received instruction queue to store received instructions (column 3, lines 25-33),

a recirculation queue (column 8, lines 13-19),

arbitration logic to select one of the received instruction queue and the recirculation queue from which to issue a current instruction (column 9, lines 42-52), and

blocked instruction detection logic to identify instructions blocked from execution by detected blocking conditions, and to enqueue the instructions onto the recirculation queue in one of a blocked state and an unblocked state, including a respective blocking condition of each instruction within the recirculation queue (column 9, lines 1-8).

21. As per claim 27-30:

Claims 27-30 recite the same limitations as claims 22-25 and are rejected for the same reasons.

***Claim Rejections - 35 USC § 103***

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Merchant et al. as applied to claims 1 and 11 above.

24. Merchant et al. teaches claims 1 and 11 for the reasons stated above.

25. As per claims 10 and 20:

Merchant et al. do not explicitly disclose using a circular queue. However, they do disclose using a FIFO queue (Merchant et al.: column 9, lines 33-36). Using a circular FIFO queue is well-known in the art since it is easier to use a circular FIFO queue than shifting each entry after each dequeue (Official Notice).

**Conclusion**

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


27. Le et al. (US Patent 6,237,081) disclose a replay system that uses multiple issue queues.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan P. Fiegler whose telephone number is 571-272-5534. The examiner can normally be reached on M-F 12-8.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on 571-272-4162. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ryan P Fiegler  
Examiner  
Art Unit 2183



**RICHARD L. ELLIS**  
**PRIMARY EXAMINER**

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